

whitish on front and sides, and narrowly behind; abdomen black, a whitish stripe on the side of basal half and two or three of the segments behind are narrowly white on the side of the apical margin; coxæ and venter almost black, four elongate whitish spots just behind hind coxæ, the basal one much the largest; trochanters black, legs brown, pale on middle of femora, darker on patellæ. Eye-tubercle moderately prominent, faintly roughened above; patella of palpus with a distinct projection at inner end about as long as width of joint, tibia scarcely longer than patella, last joint slightly curved, fully as long as tibia plus patella; basal part of abdomen finely rugulose, also the apical portion of the apical segments; legs faintly roughened.

Readily distinguished by the white front and white spots behind coxæ.

### **Leptobunus spinulatus**, sp. nov.

Length 11 mm., femur I, 5 mm., femur II, 9 mm. Black, mandibles pale yellowish, patella, tibia, and basal half of tarsus, of palpus yellow brown, coxæ dark yellow brown, extreme base of femora whitish, tarsi brownish. Eye-tubercle low, with a few spinules above, a group of numerous spinules on front border, all small; palpi with short stiff hair, tibia much longer than patella, tarsus longer than both together, nearly straight; coxæ with granules, and trochanters spinulate, rows of spinules on the femora, more irregular on patella and smaller on tibiæ; tibia II nearly smooth, with two false articulations, none in other tibiæ, none in anterior metatarsi; abdomen with transverse rows of minute, pale, pointed tubercles, rather few in a row.

Related to *L. grande*, but much more spinulate.

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## **LIFE-HISTORY OF FERALIA JOCOSA.**

BY OTTO SEIFERT.

This pretty species may be found in the vicinity of New York from the last days of March to the end of April, wherever hemlock trees (*Tsuga Canadensis*) grow in any number. The moths emerge from their pupæ about noon and ascend the hemlock trunks to develop their wings. Sometimes, on very cold days, they remain resting near the ground, as if paralyzed by the severity of the weather. When disturbed, they seem indifferent at first, but later suddenly dart off, usually to the higher branches of the trees. They are easily found, as their bright colors contrast with the dark bark, especially after rain; but they are never abundant and seem to prefer spending their lives high up amongst the foliage of the trees, so much resembling their own colors. I have never been able to find a pair in copulation, though I have often observed males and females on the same trunk. When taken home and

kept carefully with hemlock sprigs in large glass vessels, they remained nearly inactive and finally the females laid unfertilized eggs. It may be mentioned here that these moths can be kept alive for a comparatively long time when fed on slices of fresh apple.

The entire existence of this insect is bound and admirably adapted to the conifer on which it feeds. In April and May the mature hemlocks develop their flowers. The staminate aments are produced profusely on the younger, higher branches. The moth is only to be found on the larger trees. The impregnated female runs restlessly up and down the branchlets until it finds a twig with the budding staminate aments. These latter appear in numerous clusters and here on the adjoining leaves the moth deposits its rather large, pale honey yellow eggs. One or a few are glued to a leaf, mostly on the under side. The whole number of eggs rarely reaches 150.

The eggs hatch after 14 to 16 days. The pale greenish yellow larvæ at once attack the undeveloped anther sacks and feed on these only at this stage. They bury their heads and part of their bodies in the buds, covering themselves over with pollen grains. As soon as the anthers reach maturity; develop their tender filaments and turn light brown the young caterpillars leave them entirely and take to the new leaves which have just opened. In the successive stages they gradually abandon the growing leafy shoots, touching them only occasionally and, after the last molt, feed exclusively on the deep green perennial leaves. They often denude small twigs of their leaves and leave only the light green terminal shoots on the branches.

By the changes of color and design during growth the larvæ follow the successively acquired food habits. Very young larvæ are pale yellowish green, the color of the budding staminate aments; after this they change to bright, light green; then they obtain pale white longitudinal bands; later on they change to bright pea green with intense white stripes from the head to anal segment and a cherry red supra-stigmatal line bordering the white stigmatal stripe; at last the bands are broken into oval spots partly tinted and edged with yellow and red. Now the glossy, deep pea green, checkered caterpillar is admirably adapted to the deep green lacquered perennial leaves of the hemlock, variegated with flowers and buds. About six weeks after leaving the egg shell, the larval period is completed and the trim creature descends the tree, probably at night, digging into the ground close to the trunk and near the surface to form an almost oval, soft, but tenacious cocoon of earth and silk. In this it transforms to a brown pupa in a few days.

It might be rash to assume these seemingly adaptive changes of habits and colors in the larval state to be a protective measure. The insect, on account of its early appearance, hardly needs much protection from enemies. Birds are rather scarce at this time, especially in hemlock groves and probably would detect it in any case. Ichneumon flies and other parasitic hymenoptera are almost out of the question. A small Carabid beetle which ascends the trees at night and a rather large green hemipteron lurking often on the bark in day time probably never will infest the lofty habitat of the *Feralia* larvæ. Even the colors of the imago resembling the green and white mottled lichens on the bark are to all appearance of not much protective value, as some mutilated moths found near the trunks had apparently been killed by Carabids while resting on the bark. Probably the larva simply follows the general law of markings (Eimer, *Artbildung bei den Schmetterlingen*; *Orthogenesis*, etc.), gradually converting the primitive pattern of longitudinal stripes into spots. In this case these changes apparently coincide with the different surroundings which are conditioned by the altering food habits.

*Egg*.—Rather large, of the typical noctuid form; semiglobular, much flattened at base, depressed on top; pale honey yellow with faint greenish tint, extremely thin shelled and soft; closely ribbed when magnified, the ribs appear as blunt ridges with many irregular indentations, these ridges widening toward base, do not all commence from the vertex, nor do they all reach the base.

Eggs laid April 7th commenced to hatch April 21st. The young larvæ do not eat their egg shells, but making an opening side ways, they leave the delicate, colorless, transparent membrane in shape.

*First stage*.—Larvæ slender, almost pellucid, of a pale greenish yellow color. Skin not smooth but irregularly folded. Head rather large, sparsely hairy, mouth-parts and ocelli pale yellowish-brown. On 1st, 2d and 3d segments dorsally shield-like plates indicated, those on 2d and 3d are omitted after moulting. Eleventh segment humped slanting to anus, this hump before first moult has a raised shield-like plate covering the entire dorsal and subdorsal region. Segments, except thoracic and last, with five minute black dots each bearing a short slender hair arranged in the usual noctuid way (Dyar, *Classification of Lepidopterous Larvæ*); the three first segments have a few more delicate hairs and above cremaster a transverse bow of about 24 minute hairs. The young larvæ have during their earlier stages a looper-like gait and habits, holding with the after legs to a sprig and stretching the body

out like a stick. They are fond of spinning small networks over the leaves especially when moulting and drop on a thread when disturbed, but these customs are gradually abandoned during their moults. Before changing their skins they turn sordid olive green, moult during the night and eat their cast-off skins except the head shell.

*After first moult.*—The larvæ are bright yellowish green, slightly paler ventrally. Skin very transparent, contracted. Head comparatively smaller than before of very pale tan-color, mouth parts light brown, ocelli darker. First segment somewhat swollen, hump much produced. An indistinct stripe forms dorsally, more distinct from seventh to last segment, also a very pale whitish green lateral stripe.

*After second moult.*—They change to bright, glossy pea-green with pale bluish white dorsal, lateral and stigmatal stripes, all equidistant. The stripes run from first segments to the last, the stigmatal continued by a narrow line above cremaster. Cervical shield indicated by a slight depression and still brighter green, hump on top also more shiny.

*After third moult.*—The stripes turn clear, heavy white. The stigmatal one is bordered above by a cherry-red line. The larvæ vary much in deeper or lighter shade of green, from pea-green to bright olive; the red line with different individuals is more or less intense and when most prominent it is edged below with yellow and the stigmatal stripe appears cream-colored.

*After fourth moult.*—The ground color is still more glassy and transparent pea-green: stripes chalky, finely wrinkled. The dorsal stripe rather even, the lateral one almost uniform on the three first segments, but then widening in the middle of the segments and tapering in the incisures forms a chain of elongated spots. The stigmatal stripe is broken up into eleven irregular, half-moon shaped spots; conjoined. The humped 11th and 12th segments have only one spot, but enlarged; these spots are bordered above with cherry-red and shaded with yellow on the edges and junction. A pedal line of yellowish-white, oblong, irregular spots forms above the abdominal feet and on the tenth segment.

*After fifth moult.*—The larvæ attain their maturity. Full-grown they are nearly cylindrical, about 32 to 35 mm. long, width 4.5 mm. All 16 feet normally developed. Eleventh segment forming a hump slanting to cremaster. The few short delicate hairs distributed as before, but hardly perceptible. The finely granulated skin folded, especially on stigmatal area. Ground color deep, glossy pea-green, very transparent; head and legs more yellowish green; cervical shield and hump still brighter green. Dorsal and lateral stripes chalky white, finely

wrinkled, running from first segment to last. Dorsal stripe uninterrupted, on thoracic segments nearly uniform, then widening in the middle of segments and narrowing in the joints. The lateral stripe follows the same principal, but in a more complete way, being almost uniform on thoracic segments and forming a chain of spindle-shaped spots on the abdomen connected by a narrow line. The spot on the eleventh segment runs in a line to anal plate. From first to last segment a stigmal row of eleven large, half-moon shaped, cream colored spots, yellow on the edges and bordered above their full length with cherry red; on the three first segments the spots are more elongated forming almost a band, but they are disconnected; on last two segments one large spot which ends in a narrow white stripe, edged above with yellow, bordering the anal plate. A pedal line of oblong, irregular cream colored spots, one on each segment except on first and twelfth. Spots on second and third segments smaller than the others, the latter extending almost over the whole width of the segment.

The larvæ vary in the deeper or lighter shade of green, the intensity of the red color and prominence of the yellow edgings. One of about 75 full grown caterpillars had all, even the dorsal stripe, converted into oval spots.

From May 30th to June 3d all but a few sickly stragglers had gone into the ground. Some forming their cocoons on the surface, only covered by moss and dry hemlock leaves.

*Cocoon*.—Rather soft but durable, made of earth and silk.

*Pupa*.—Rather stout anteriorly, head cases slightly rounded, almost blunt; movable segments tapering much to anal joint, the latter ends in two fine hooks with which the pupa is fastened to the cocoon. Thorax and wing cases brown, the former shagreened, the latter wrinkled, antennæ cases clearly visible, but not much produced. Abdominal segments more reddish brown, finely punctured, the movable ones only so anteriorly. Length of pupa 15 mm., widest in the middle, 5 mm.

The imagines do not vary much in size. Almost all expand 34 mm. (about 50 specimens). There is more variation in ground color and the black scales in median space. The former varies from pea-green to bright olive; also appearing in all shades of cream color. The whole median space is often powdered with black scales, sometimes only partly and in a few specimens the black scales are omitted. The white and black t. a. and t. p. lines are nearly always regular and distinct. The green females seem to be in the majority, but in general the variability in either way is not confined to any sex, nor has the flying



anything to do with it since undeveloped soft winged green females, as well as cream colored ones have been found. Hind wings and vestiture not subject to noticeable variation, nor the underside of primaries and secondaries, which differs only slightly in deeper or lighter shading.

[NOTE.—This larva has occurred to me in the Adirondacks on the balsam fir. Its pattern of markings and coloration are strikingly like those of the pine-feeding *Sphingidæ*, doubtless in adaptation to the similar environment. H. G. Dyar.]

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## A NEW DIPTEROUS GENUS BELONGING TO THE THEREVIDÆ.

BY D. W. COQUILLETT.

### *Henicomys*, gen. nov.

Antennæ slightly longer than the thorax, cylindrical, first joint two-thirds as long as the head, the second broader than long, one-fifth as long as the first, third joint of nearly an equal diameter until near the tip, almost twice as thick as the first joint and nearly four times as long, the apical portion tapering gradually to the tip which is truncated and destitute of a style; head nearly twice as broad as long, face bare; proboscis rather slender, the labella of about the same diameter as the proboscis proper, the two together slightly longer than the head; palpi slender, their apices considerably dilated; three ocelli present. Abdomen slender, fully three times as long as the thorax. Wings with two submarginal and five posterior cells, the fourth posterior and anal cells closed and short petiolate. Type, the following species:

### *Henicomys hubbardii*, sp. nov.

♂. Head black, front somewhat polished, at narrowest part one-third as wide as either eye, antennæ yellow, the second joint and apical portion of the third, brown; proboscis brown, the under side of the basal portion yellow; palpi brown, the apices yellow; a row of black macrochætæ extending around the upper half of the occiput. Thorax and scutellum yellow, polished, a white pruinose vitta in middle of dorsum of thorax, considerably expanded behind the suture, and a white pruinose spot on upper part of the pleura in front of the insertion of each wing; a black macrochæta above, and another in front of, the insertion of each wing, thorax elsewhere, and the scutellum, bare. Abdomen black, polished, the extreme base yellowish, the posterior margins of the first four segments white; hypopygium nearly twice as long as the seventh, or last, abdominal segment. Wings hyaline, a brown cloud on veins at apex of second basal cell, and a brown fascia extending from the costa, a short distance before the apex of the second vein, to the base of the third posterior cell. Coxæ yellow, the posterior ones largely brown and covered with a silvery-white pruinosity;